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(54) **IMPELLER ENCLOSURE**

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A47K 3/022 (2006.01)

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See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

555,860	A		3/1896	Hanger
2,061,142	A		11/1936	Denocenzo
2,250,315	A	*	7/1941	Rocke 68/184
2,307,621	A		1/1943	Dorton
2,312,524	A		3/1943	Cox
2,336,127	A	*	12/1943	Rocke 4/622
2,417,499	A		3/1947	Ille
2,452,405	A		10/1948	Vincent, Jr.
D160,368	S		10/1950	Centerbar
2,733,711	A		2/1956	Gibson
2,738,787	A		3/1956	Jacuzzi et al.
3,159,849	A		12/1964	Jacuzzi
3,273,560	A		9/1966	Jacuzzi
3,287,741	A		11/1966	Nash
3,297,025	A		1/1967	Jacuzzi
3,760,800	A		9/1973	Staffin et al.
3,832,740	A		9/1974	McClarrin
3,924,278	A		12/1975	Ekman
3,940,807	A		3/1976	Baker et al.
3,964,471	A		6/1976	Saethre
3,965,495	A		6/1976	McNair
4,004,302	A		1/1977	Hori
4,100,917	A		7/1978	Talge et al.
4,115,878	A		9/1978	Johnson et al.
4,168,705	A		9/1979	Raab
4,181,124	A		1/1980	Pauletich
4,184,488	A		1/1980	Bielich
4,330,412	A		5/1982	Frederick

(Continued)

FOREIGN PATENT DOCUMENTS

DE 37 16 683 A1 12/1988

(Continued)

OTHER PUBLICATIONS

Golden Ratio Woodworks—The Grand Versailles, available at http://www.goldenratio.com/GRW/Spa/GrandVersailles.html, © 2005 Golden Ratio, All Rights Reserved (1 p.).

(Continued)

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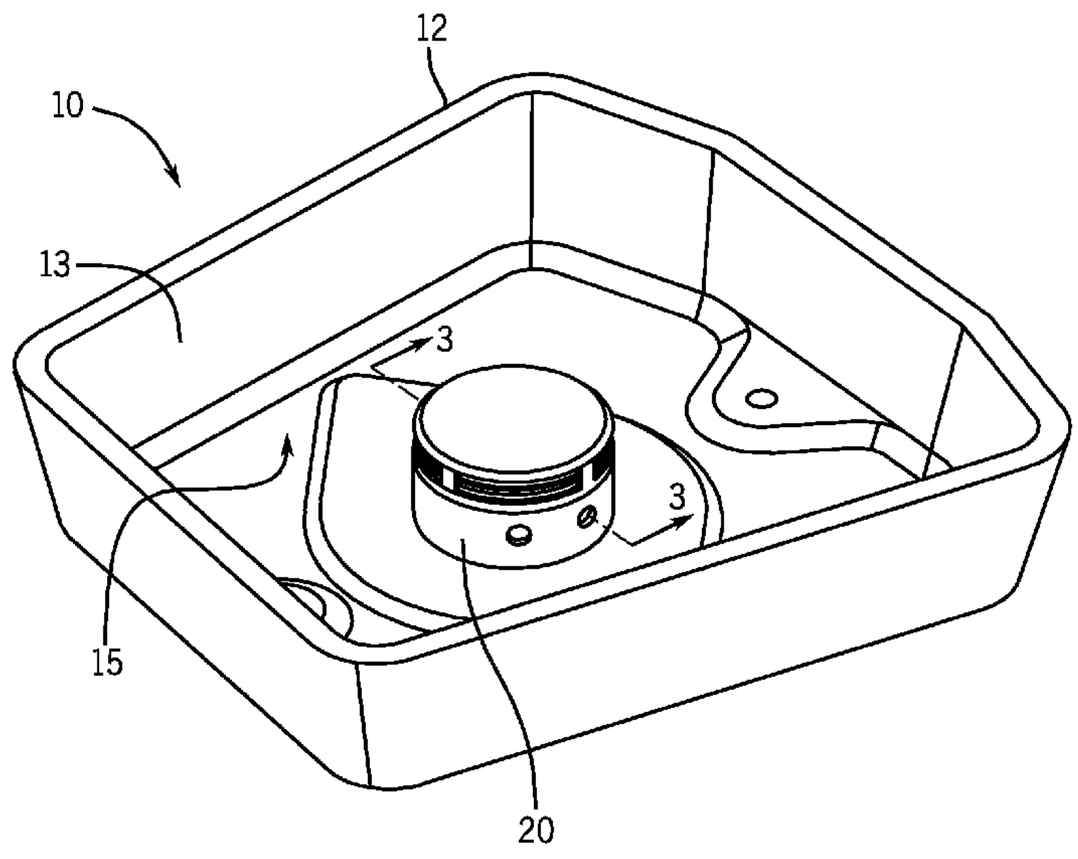
(57) **ABSTRACT**

A pedicure spa including a fluid retaining basin. An impeller operatively coupled to the basin. An enclosure removably coupled to the basin, the enclosure including an upper region and a lower region, and defining a plurality of orifices in the upper region and the lower region, with the enclosure configured to enclose the impeller and direct fluid flow towards a foot region of the basin defined between a wall of the basin and the lower region of the enclosure.

17 Claims, 4 Drawing Sheets



U.S. PATENT DOCUMENTS

4,349,434	A	9/1982	Jaworski
4,420,846	A	12/1983	Bonner
4,485,503	A	12/1984	Rolando et al.
4,520,525	A	6/1985	Yogi et al.
4,525,881	A	7/1985	Higginbotham
D288,037	S	2/1987	Orenstein
4,665,572	A	5/1987	Davidson et al.
4,742,584	A	5/1988	Abe
4,853,987	A	8/1989	Jaworski
4,903,352	A	2/1990	Murakami
4,984,583	A	1/1991	Peterson et al.
5,044,357	A	9/1991	Johns
5,083,329	A	1/1992	Murakami
D342,165	S	12/1993	Marshall et al.
5,414,878	A	5/1995	Booth
D363,168	S	10/1995	Lewis
D372,843	S	8/1996	Trent et al.
5,587,023	A	12/1996	Booth
5,588,161	A	12/1996	Barradas
5,729,841	A	3/1998	Chan
5,816,659	A	10/1998	Wolf
D403,515	S	1/1999	Lewis
6,003,166	A	12/1999	Hald et al.
D421,853	S	3/2000	Black
D429,379	S	8/2000	Kim
D434,916	S	12/2000	Galati, Jr. et al.
D435,937	S	1/2001	Back et al.
6,357,059	B1	3/2002	Lau
D455,017	S	4/2002	Tran
D455,566	S	4/2002	Park
D456,154	S	4/2002	Huynh et al.
6,363,548	B1	4/2002	Kuo
6,393,633	B2	5/2002	Ferber
6,405,390	B2	6/2002	Kuen
6,438,768	B1	8/2002	Yen
6,503,212	B2	1/2003	Park
6,565,522	B1	5/2003	Chen
6,598,244	B1	7/2003	Yeh
D479,919	S	9/2003	Genelli et al.
6,659,112	B1	12/2003	Haupt
D487,533	S	3/2004	Abbott et al.
D489,140	S	4/2004	Froech
6,732,387	B1	5/2004	Waldron
6,790,188	B2	9/2004	Chen
6,805,678	B2	10/2004	Cafaro
6,880,182	B2	4/2005	Gruenwald
6,916,297	B2	7/2005	Hafemann
6,923,206	B2	8/2005	Glover et al.
6,973,683	B2	12/2005	Lev et al.
6,979,300	B1	12/2005	Julian et al.
D518,182	S	3/2006	Cafaro et al.
7,028,362	B2	4/2006	Davallou
7,065,808	B2	6/2006	Leung et al.
2004/0117905	A1	6/2004	Gruenwald
2004/0177438	A1	9/2004	Gruenwald et al.
2004/0216225	A1	11/2004	Booth et al.
2005/0132487	A1	6/2005	Layfield et al.
2007/0226896	A1	10/2007	Fugate et al.

FOREIGN PATENT DOCUMENTS

JP	6-46964		2/1994
JP	6-78858		3/1994
JP	6-339509		12/1994
WO	WO 95/26706	A1	10/1995

OTHER PUBLICATIONS

SpaEquip: La Fleur Pedicure Chair from Gulfstream, available at http://www.spaequip.com/store/GSLF.jsp, © 2000-2004 SpaEquip, All Rights Reserved (1 p.).

European Patent Office Communication for Application 07784370.4, dated Apr. 15, 2010, 5 pages.

PCT International Search Report related to International Application No. PCT/US2007/070736, date of mailing of the International Search Report, Nov. 8, 2007, 3 pages.

PCT Written Opinion of the International Searching Authority relating to International Application No. PCT/US2007/070736, date of mailing Nov. 8, 2007, 7 pages.

* cited by examiner

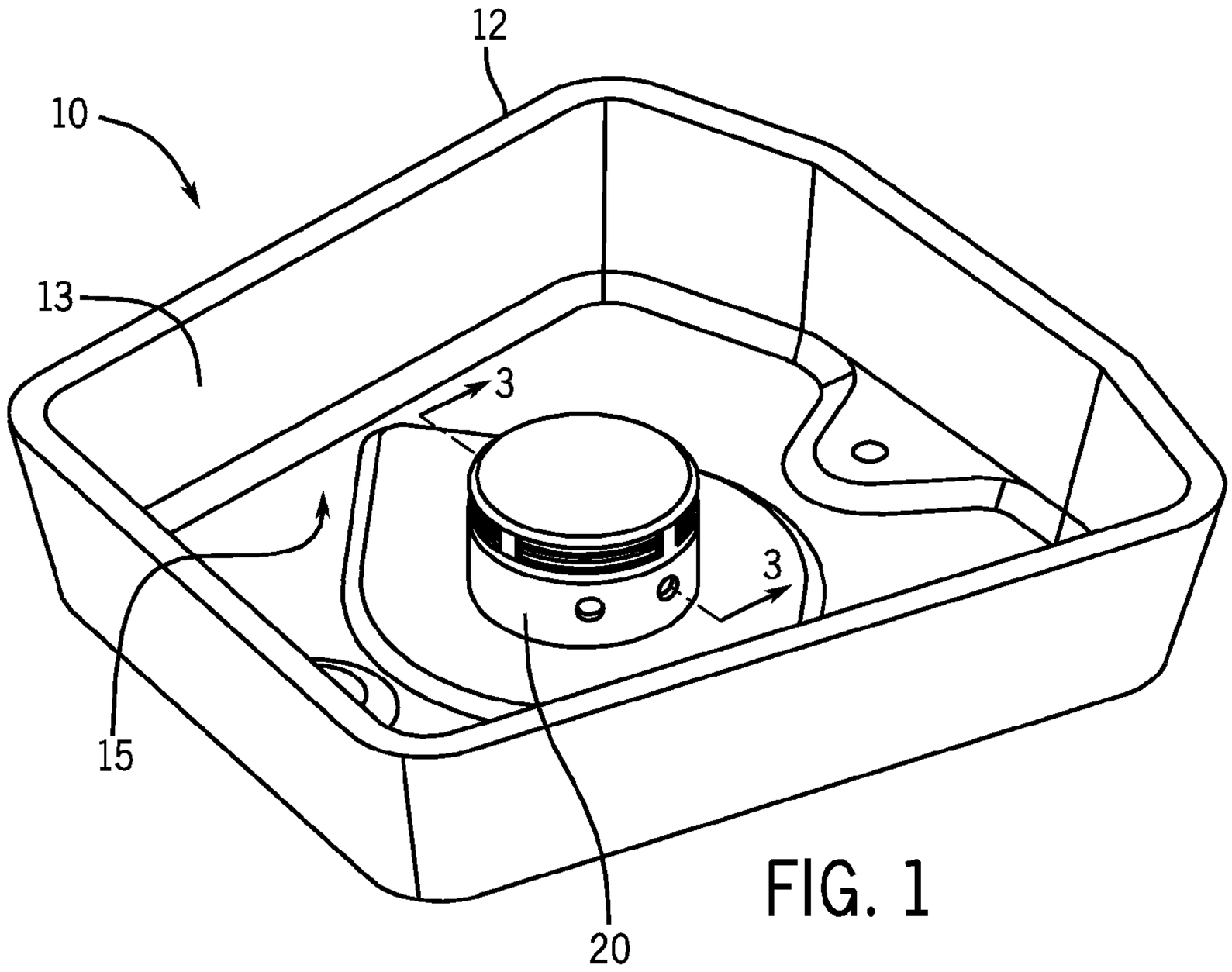

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FIG. 1

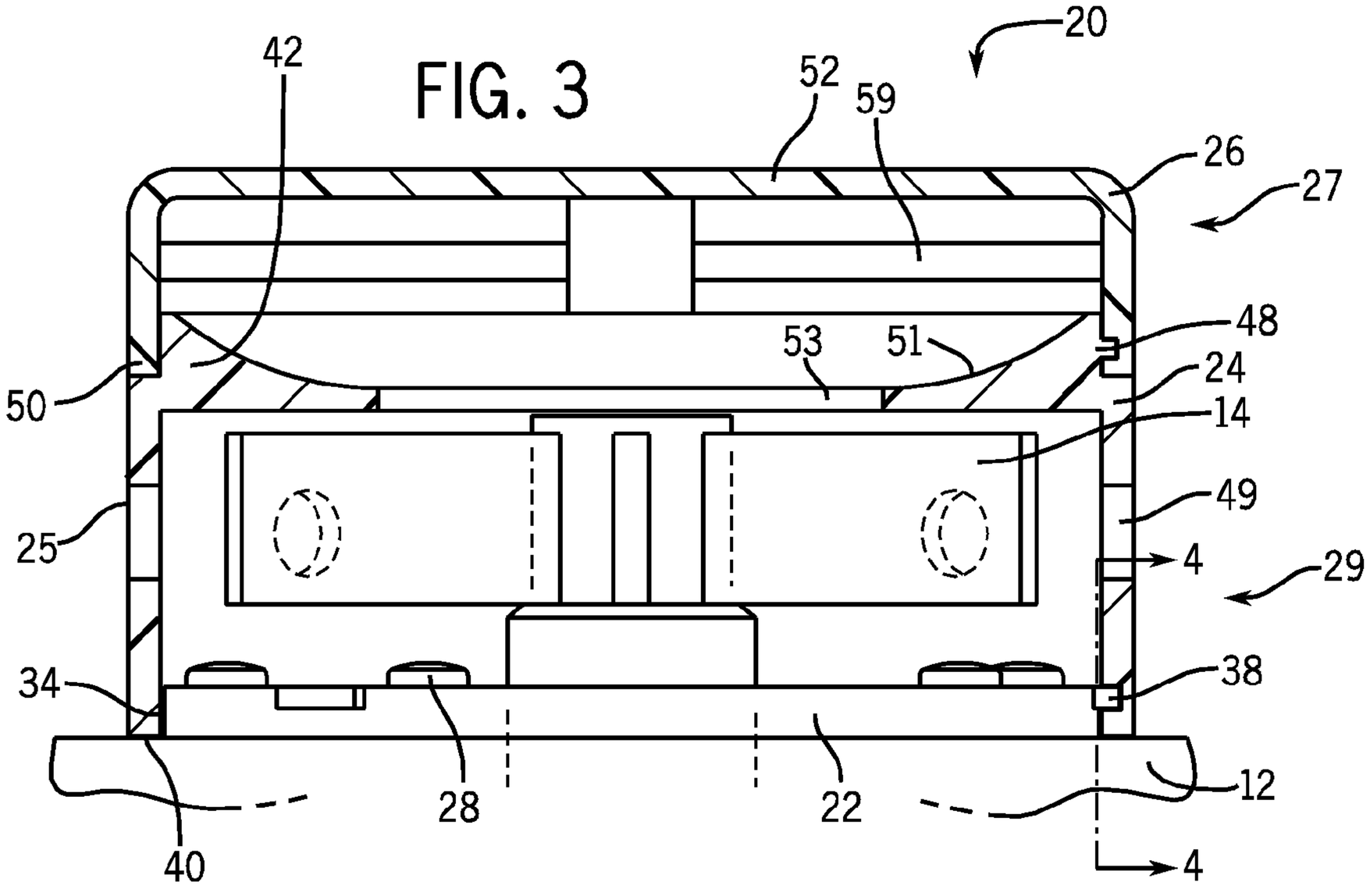
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FIG. 3

FIG. 2

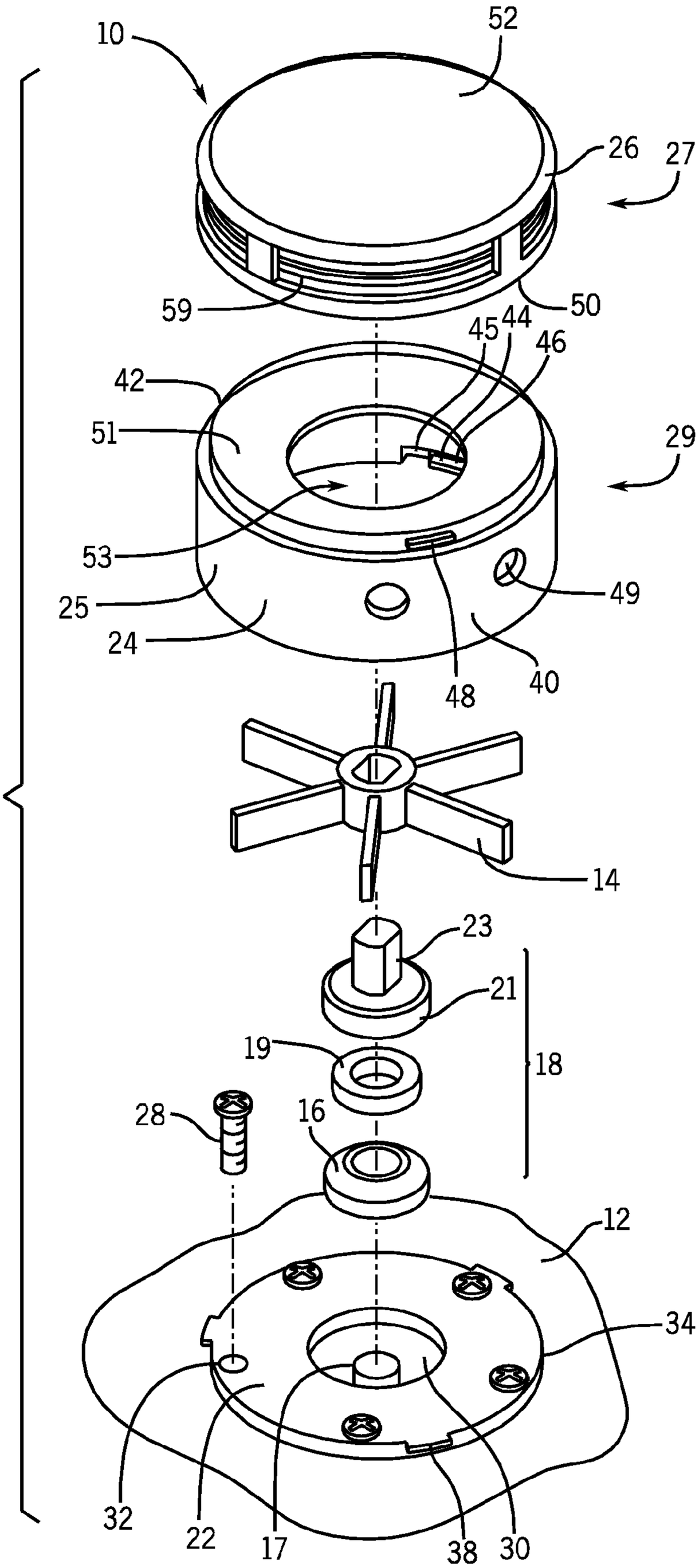
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FIG. 4

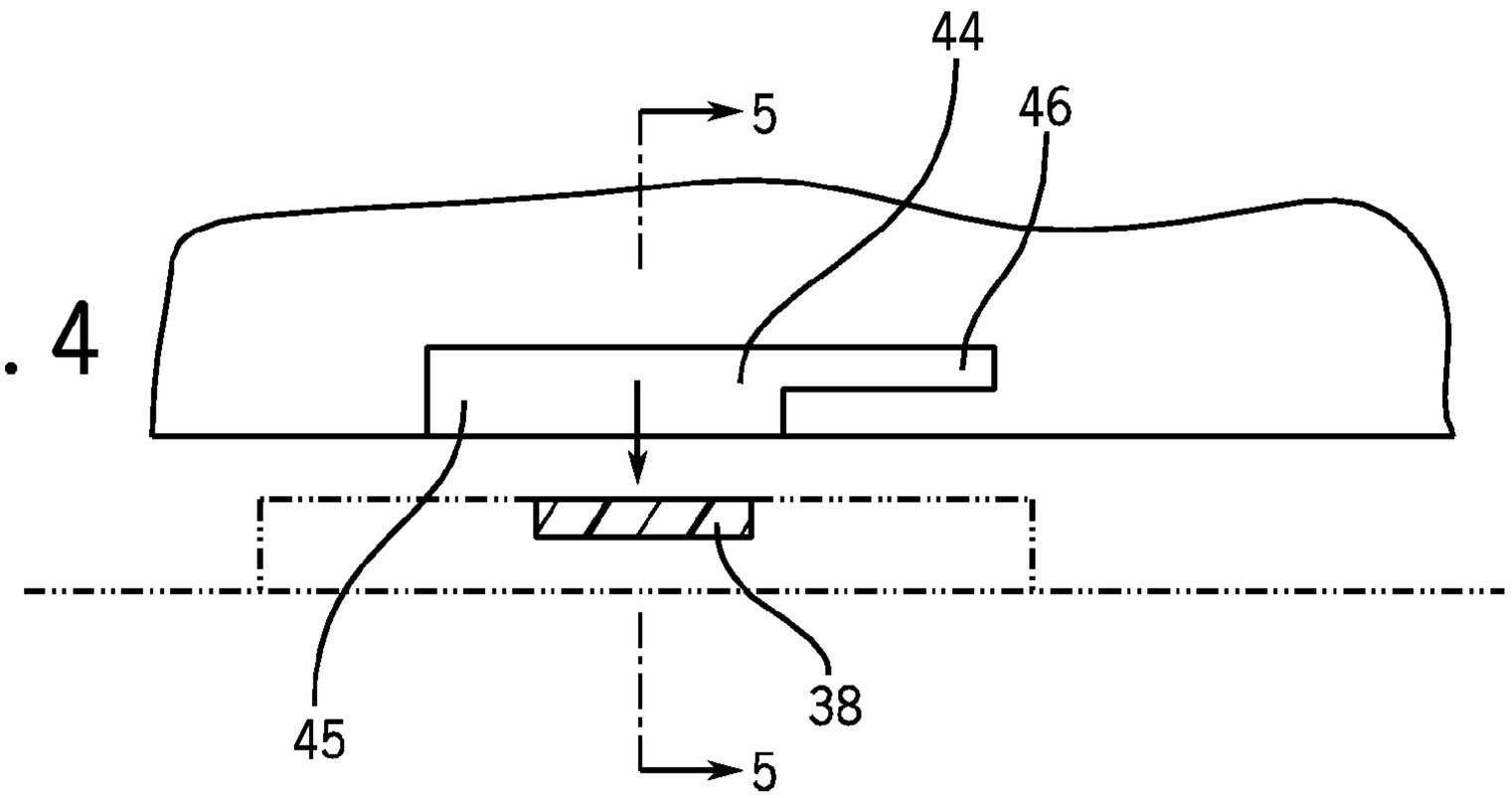


FIG. 6

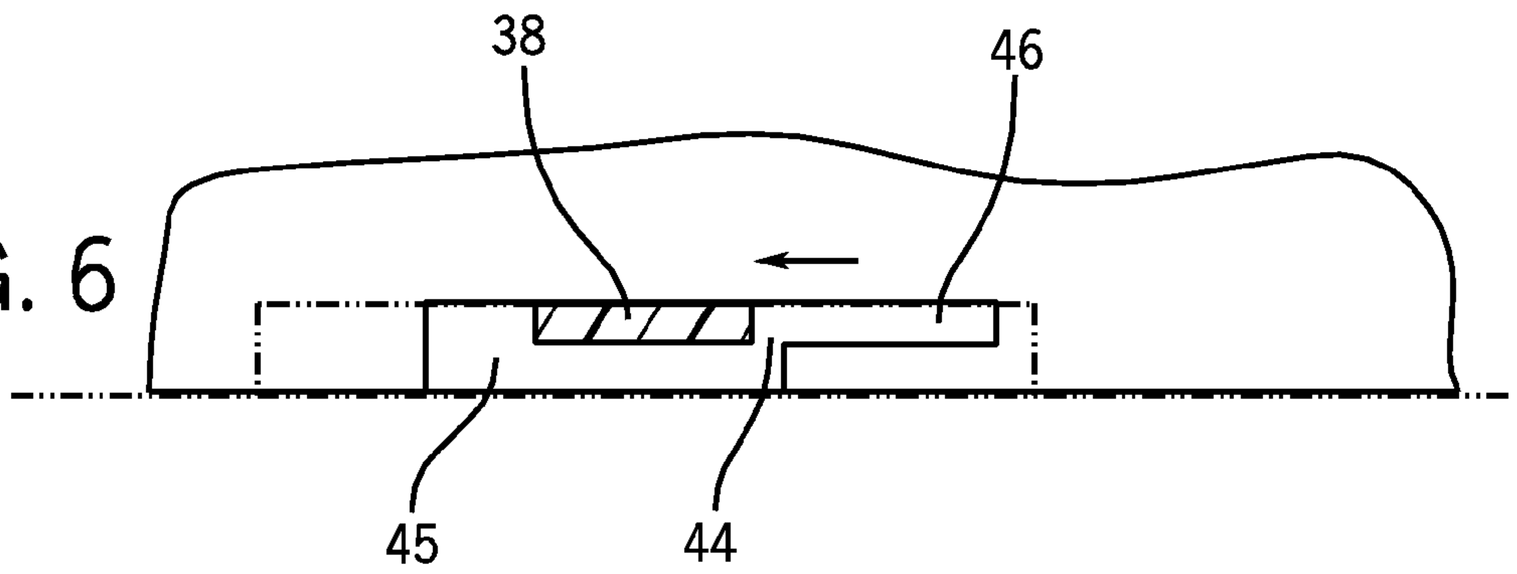
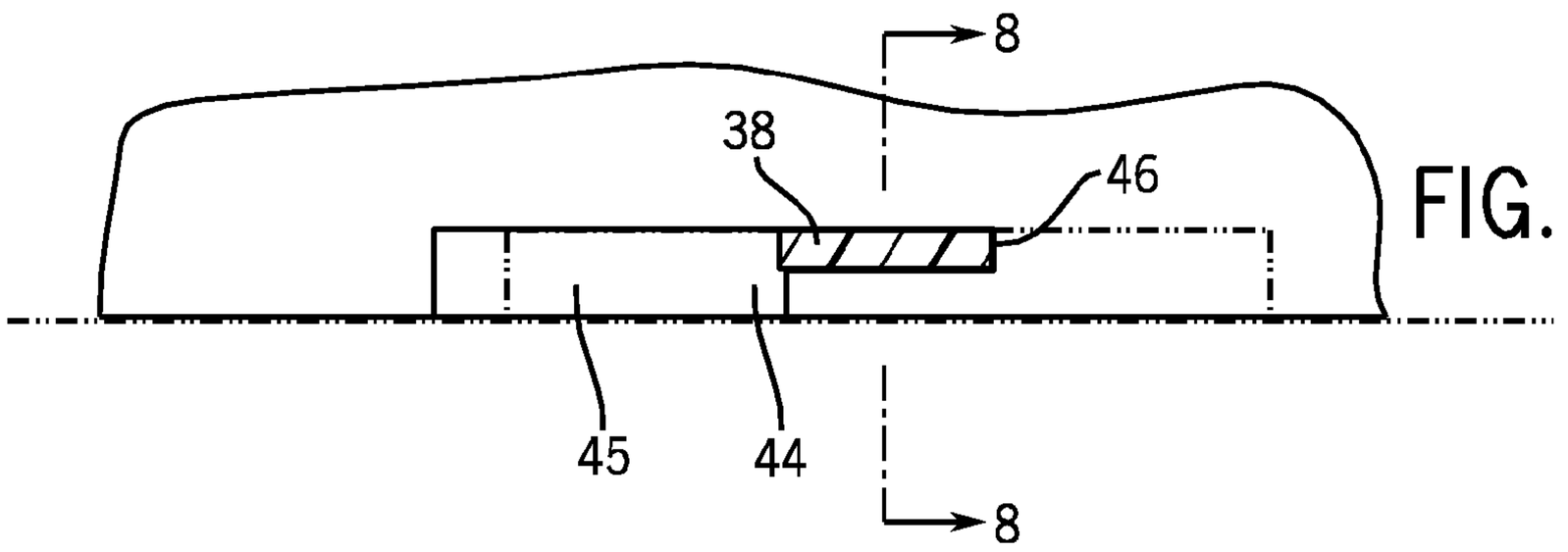


FIG. 7



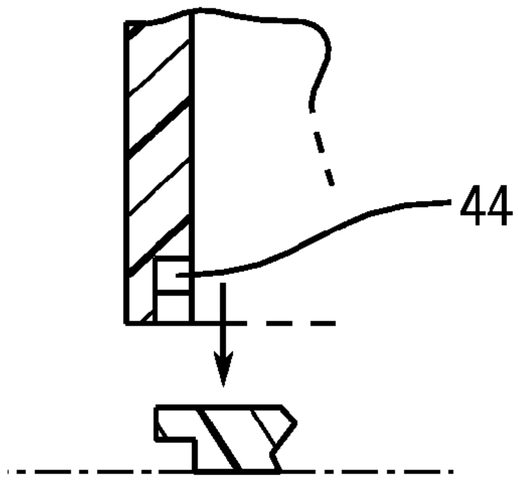


FIG. 5

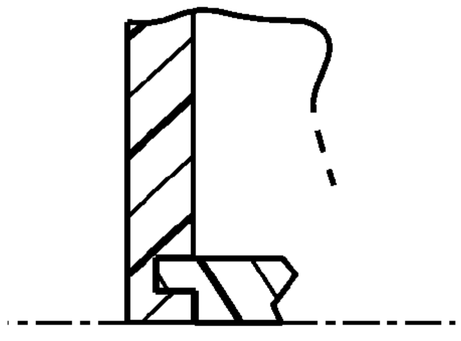
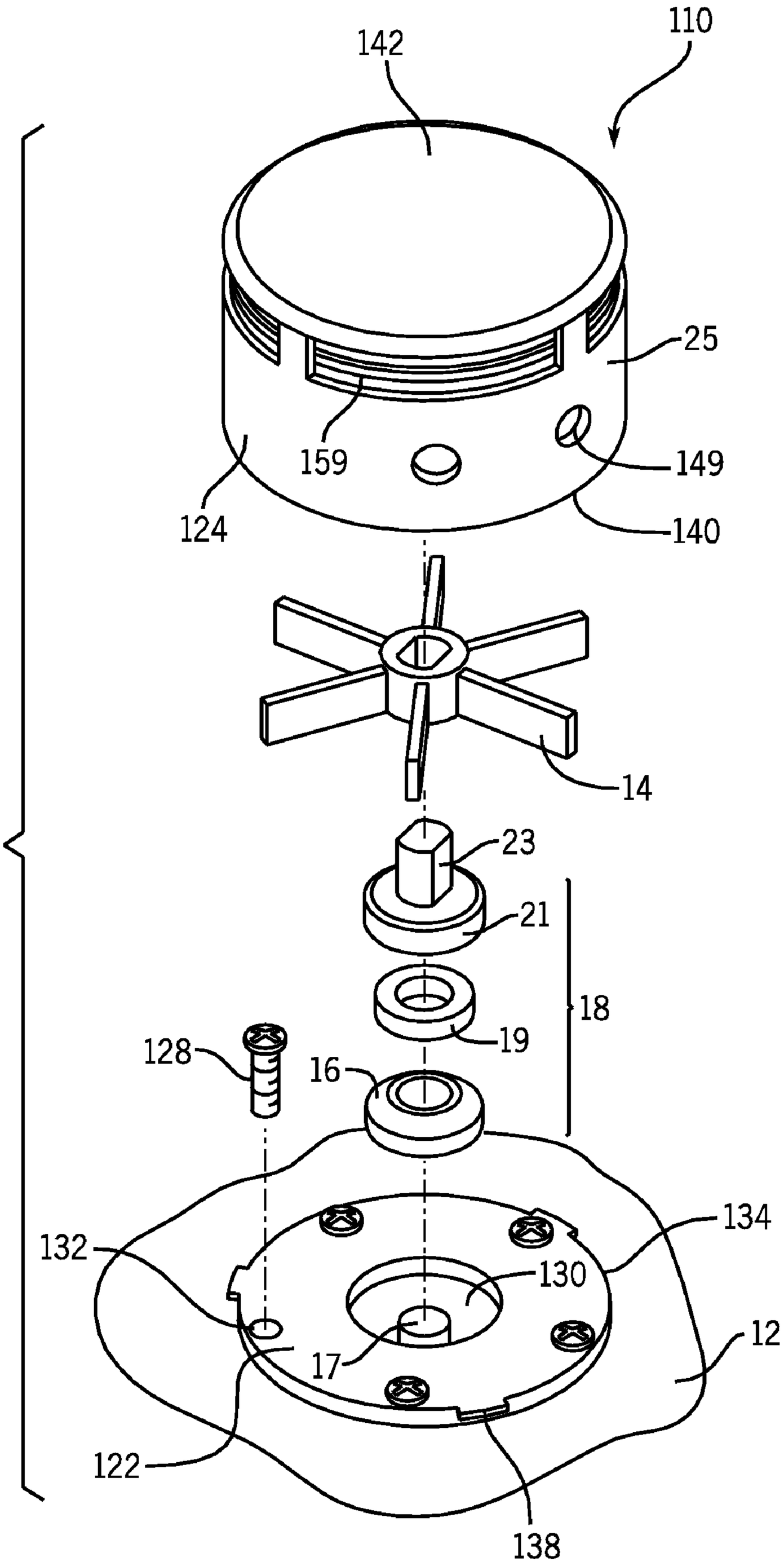


FIG. 8

FIG. 9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IMPELLER ENCLOSURE

FIELD OF THE INVENTION

The present invention relates generally to the field of spa devices. More specifically, the invention relates to a closure for an impeller for use in a fluid basin to provide a massaging effect in a pedicure spa.

BACKGROUND OF THE INVENTION

It is generally known to provide for a spa device, such as pedicure spas, health spas, whirlpools, jet stream exercisers, foot spas, etc. Such known spa devices are typically used in commercial and recreational settings for hydrotherapy, massage, stimulation, pedicure, and bathing purposes. However, such spa devices have several disadvantages including being difficult to thoroughly clean, requiring complicated maintenance schedules.

Water quality can become a problem in systems that use circulating water that comes into contact with the human body where the spa is not thoroughly cleaned. Several actions have been taken in an attempt to overcome this difficulty, including the addition of chemicals (e.g., bleach) into the water to help control bacteria growth. Despite such efforts, however, water quality is sometimes still difficult to maintain. For example, bacteria can develop simple defense mechanisms to counter chemical attacks such as forming a protective outer coating that acts as a barrier against harsh chemical treatments. The destruction of the outer coating is generally difficult with chemicals alone. Often times, chemicals are only effective in destroying the outer coating when used for extended periods of time, sometimes hours. Therefore, the preferred method of eliminating bacteria from systems is through mechanical means such as abrasion (e.g., removal with a rag and a chemical cleanser that has anti-bacterial capabilities). Furthermore, many spa devices have intricate and elaborate systems of pipes that move water from a pump, through a filtering system, and ultimately to one or more nozzles (e.g., openings) that deliver water back to a basin for re-circulation. In the case of a pedicure basin, the process of cleaning after each pedicure involves draining the water from the system, spraying the basin with some type of anti-bacterial cleanser, circulating the water for a period of time, rinsing and then refilling with fresh water. Because there are pipes and fittings, it is often difficult to mechanically scrub every component that comes into contact with water. In addition, after a system is drained, some water may remain within the piping system, usually in cracks and crevices or low spots in the pumping system. For example, the pump itself is usually a sealed unit that may be difficult to completely drain. It is within these areas that the bacteria tend to grow the outer coating as a defensive mechanism against attack from anti-bacterial chemicals, especially when the pedicure system is not used for extended periods (e.g., overnight, weekends, etc.). Consequently, water quality may be diminished in conventional piped systems that are not effectively cleaned.

Another problem with known spa devices is that they often provide a harsh massaging effect to the feet by pointing a small number of nozzles (e.g., openings) toward the feet. These nozzles are generally connected via pipes and hoses to a single centrifugal pump that produces a very high pressure (20-40 psi) and a relatively low volume of water. Customers often complain that the jets of water produced in this manner are too rough, in some cases even producing pain or discomfort. Although the jets can be partially closed to reduce the force of the water stream, this also reduces the water volume.

Consequently, the massage effect is minimized since the jets are often a considerable distance away from the feet (e.g., in the walls of the basin).

Accordingly, it would be advantageous to provide a spa apparatus that substantially avoids the problems of bacterial growth by eliminating the need for pipes and/or pumps. Further, it would be advantageous to provide a spa apparatus with a removable enclosure for the impeller that provides a series of apertures through which fluid is moved to create a massage effect. Further, it would be advantageous to provide an enclosure with a relatively small number of components that is easily removable to facilitate easy cleaning of the spa. Additionally, it would be desirable to provide an easily removable pump system that may be exchanged and/or cleaned in a sanitation bath or dishwasher.

SUMMARY OF THE INVENTION

One embodiment of the invention relates to a pedicure spa containing fluid including a fluid retaining basin. An impeller operatively coupled to the basin. An enclosure removably coupled to the basin, the enclosure including an upper region and a lower region, and defining a plurality of orifices in the upper region and the lower region, with the enclosure configured to enclose the impeller and direct fluid flow towards a foot region of the basin defined between a wall of the basin and the lower region of the enclosure.

Another embodiment of the invention relates to an enclosure for an impeller included in a pedicure spa having a fluid retaining basin. The enclosure includes a cylindrical impeller housing having a closed end proximate an upper region and an open end proximate a lower region. A plurality of orifices defined in the upper region and the lower region, with the impeller housing configured to enclose the impeller and direct fluid flow towards a foot region of the basin defined between a wall of the basin and the lower region of the impeller housing.

Another embodiment of the invention relates to a spa apparatus that includes a basin for retaining fluid. An impeller operatively coupled to the basin. A motor coupled to the impeller. An enclosure removably coupled to the basin, the enclosure having an upper region and a lower region, and defining a plurality of orifices in the upper region and the lower region, with the enclosure configured to enclose the impeller and direct fluid flow towards a foot region of the basin defined between a wall of the basin and the lower region of the enclosure, the enclosure including a gasket coupled to the basin, with the gasket defining a tab on the gasket circumference edge, a cylindrical impeller housing having a first end and a second end, with the impeller housing defining a first key slot proximate the first end and configured to engage the tab, and with the impeller housing defining a protrusion proximate the second end. A cover having a closed end and an open end, with the cover defining a second key slot proximate the open end and configured to engage the protrusion, wherein the impeller is in fluid communication with the basin and enveloped in the enclosure when the tab and first key slot are engaged and the protrusion and second key slot are engaged.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an isometric view of a spa including an enclosure for an impeller according to an exemplary embodiment.

FIG. **2** is an exploded view of the enclosure and impeller system in FIG. **1** according to an exemplary embodiment.

FIG. **3** is cross-section of the enclosure in FIG. **1** taken along line **3-3**.

FIGS. **4-8** are partial cross-sections of the impeller enclosure in FIG. **3** showing the coupling of two components. The coupling involves a tab or protrusion on a first component and a key channel on a second component.

FIG. **9** is an exploded view of an enclosure for an impeller according to another exemplary embodiment.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

Referring to FIG. **1**, an enclosure for an impeller for a pedicure spa **10** is shown according to an exemplary embodiment. According to an exemplary embodiment, a spa **10** includes a fluid-retaining basin **12** that is configured for use in foot massages, pedicures and other activities related to the feet, including bathing, soaking, stimulating, etc. It should be understood that other spa uses, for example a full body spa or a bath tub can employ the impeller enclosure system.

Basin **12** includes upright walls **13** and is configured to retain fluid (e.g., water) for use with various cleaning and/or massage activities. A foot region **15** is defined between the walls **13** of the basin **12** and the enclosure **20**. Spa **10** also includes an impeller **14** operatively coupled to basin **12**, and a motor (not shown) located external to basin **12** for rotating impeller **14**.

An impeller coupling assembly **18** secures the impeller **14** to the motor pump shaft **17** while providing a water tight seal to prevent water from leaking from the basin. Impeller coupling assembly **18** a spring biased water seal **16** having a spring member such as a coil spring located therein, a carbon ring **19**, and an upper impeller shaft **21**.

Spring biased water seal **16** includes a lower metal plate holding the coil spring. An upper metal plate covers the top portion of the coil spring. A rubber jacket secures the upper and lower metal plates and coil spring together. The rubber jacket fits within the opening of the basin about threaded pump shaft **17**.

Upper impeller shaft **21** includes a recess (not shown) facing the spring biased seal **16**. A rubber housing is located within the recess to hold a ceramic ring seal that freely rotates on carbon ring seal **19**. Upper impeller shaft **21** includes a female threaded bore that threadingly receives threaded pump shaft **17**. Upper impeller shaft **21** further includes a keyed shaft **23** that is received within a keyed opening of impeller **14**.

The impeller coupling assembly **18** is assembled by placing spring biased seal **16** within an opening of the basin proximate opening **30** of the lock plate **22**. Carbon ring **19** is located in a recess proximate the top of spring biased seal **16**. Upper impeller shaft **21** is threaded onto threaded pump shaft **17**. As upper impeller shaft **21** is threaded on to pump shaft **17** spring biased seal **16** is compressed and the rubber jacket is forced outwardly forming the water tight seal. The ceramic ring within the upper impeller shaft **21** forms a rotating seal with carbon ring **19**.

Referring now to FIGS. **2-8**, in one exemplary embodiment, enclosure **20** is configured to substantially enclose impeller **14** and separate impeller **14** from the interior of basin **12**. Enclosure **20** includes a lock plate **22**, a cylindrical impeller housing **24**, and an impeller cover **26**. As explained further below, fluid is pulled into enclosure **20** by the action of impeller **14** and expelled from enclosure **20** wherein the massage effect is created.

Lock plate **22** is a generally flat member that is coupled between impeller housing **24** and basin **12**. Lock plate **22** is an annular body with a central opening **30**, a plurality of apertures **32** and an outer circumference edge **34**. Lock plate **22** may also provide a sealing function and may be formed from any material that is suitable for substantially sealing the space between impeller housing **24** and basin **12** (e.g., silicone, polychloroprene rubber, etc). Central opening **30** receives a shaft **17** from the motor. Apertures **32** may be provided circumferentially in lock plate **22** to receive a fastening member, shown as screws **28**, used to couple lock plate **22** to basin **12**. Outer circumference edge **34** includes one or more generally evenly spaced coupling features, shown as tabs **38** (e.g., protrusions, projections, extensions, flaps, etc.). Tabs **38** are configured to engage features in impeller housing **24** to couple lock plate **22** to impeller housing **24**.

Impeller housing **24** is a generally thin-walled member with an inner diameter approximately equal to the outer diameter of lock plate **22**. Impeller housing **24** has a lower end **40** and a upper end **42** opposite lower end **40** and a sidewall **25** extending therebetween. Lower end **40** has a plurality of key slots **44** spaced approximately equal to the spacing of tabs **38** on lock plate **22**. Upper end **42** has a plurality of generally evenly spaced coupling features, shown as tabs **48** (e.g., protrusions, projections, extensions, flaps, etc.) that extend outward from impeller housing **24**. Tabs **48** are configured to engage features in cover **26** to couple impeller housing **24** to cover **26**. Impeller housing **24** also includes one or more orifices **49** may be evenly spaced about the periphery of impeller housing **24** proximate lower end **40**. Orifices **49** may also be located to face the sides of the basin and not the front and/or back in order to direct the flow. Further, orifices **49** may be located to face the forward part of the basin to create a flow that hits the front portion of the basin and then flows along bother side walls of the basin toward a rear region of the basin. Orifices **49** are openings (e.g., apertures, holes, outlets etc.) that allow fluid to be expelled from impeller housing **24**. Impeller housing **24** may be composed of various materials including plastic, metal, or some combination of plastic and metal.

Referring now especially to FIGS. **4-8**, a coupling mechanism, involving key slots **44** is shown. Key slots **44** have a vertical portion **45** extending inward from lower end **40** and a horizontal portion **46** extending sideways from the end of vertical portion **45** opposite lower end **40**. Impeller housing **24** is coupled to lock plate **22** by sliding impeller housing **24** over lock plate **22**, fitting tabs **38** into vertical portions **45** of key slots **44**. Impeller housing **24** is then rotated slightly, sliding tabs **38** into horizontal portions **46** of key slots **44**, substantially trapping tabs **38** in key slots **44**.

Cover **26** is a generally cup-shaped member (e.g., lid, cap, top, etc) with a diameter that may be approximately equal to the diameter of impeller housing such that when cover **26** is coupled to impeller housing **24**, they form a substantially smooth outer surface. Cover **26** has an open end **50** and a closed end **52** opposite open end **50**. Open end **50** has a plurality of key slots spaced approximately equal to the spacing of tabs **48** on impeller housing **24**. Cover **26** is coupled to impeller housing **24** in a manner similar to the manner impeller housing **24** is coupled to lock plate **22**. When cover **26** is engaged with impeller housing **24**, impeller housing **24** and cover **26** form a single unitary member enveloping impeller **14**. Cover **26** also includes one or more arcuate slots **59** evenly spaced about the periphery of cover **26** proximate closed end **52**. Arcuate slots **59** are openings (e.g., apertures, holes, inlets etc.) that allow fluid flow into the impeller housing **24**. Cover **26** may be composed of various materials including plastic, metal, or some combination of plastic and metal.

Enclosure **20** defines an upper region **27** and a lower region **29**. Enclosure **20** directs fluid flow towards the foot region **15** which in one exemplary embodiment is defined between a wall **13** of basin **12** and lower region **29** of enclosure **20**. Upper region **27** and lower region **29** of enclosure **20** can be separated by an intermediate baffle **51** positioned inside enclosure **20**. Intermediate baffle **51** defines a circular opening **53**, typically centrally located. Circular opening **53** provides fluid communication between upper region **27** and lower region **29** of enclosure **20**. Intermediate baffle **51** may be formed integrally with impeller housing **24**. It is also contemplated that baffle **51** may define a plurality of openings to provide fluid communication within enclosure **20**. However, circular opening **53** provides a funneling effect of the fluid from upper region **27** to lower region **29**. This provides enhanced flow from impeller **14** to orifices **49** in impeller housing **24**.

Referring to FIGS. **2** and **3**, intermediate baffle **51** extends inwardly from enclosure housing **24** and extends over a portion of the impeller **14**. Impeller **14** has a rotational axis and an outer edge distal from the rotational axis. Baffle **51** extends inwardly over the outer edge of the impeller **14** toward the rotational axis of impeller **14**. Baffle opening **53** is offset from the outer edge of impeller **14** toward the rotational axis of impeller **14**.

According to other exemplary embodiments, the fluid pressure may be raised or lowered by changing the shape or number of either orifices **49** or arcuate slots **59**.

Referring now to FIG. **9**, an enclosure is shown according to another exemplary embodiment. Enclosure **110** is configured to substantially enclose impeller **14** and separate impeller **14** from the interior of basin **12**. Enclosure **110** comprises a lock plate **122** and a cylindrical impeller housing **124**. Lock plate **122** is a generally flat sealing member that is coupled between impeller housing **124** and basin **12**. Lock plate **122** is an annular body with a central opening **130**, a plurality of apertures **132** and an outer circumference edge **134**. Central opening **130** receives a shaft **17** from the motor. Apertures **132** may be provided circumferentially in lock plate **122** to receive a fastening member, shown as screws **128** used to couple lock plate **122** to basin **12**. Lock plate **122** may be plastic and/or any material that is suitable for substantially sealing the space between impeller housing **124** and basin **12** (e.g., silicone, polychloroprene rubber, etc). Outer circumference edge **134** includes one or more generally evenly spaced coupling features, shown as tabs **138** (e.g., protrusions, projections, extensions, flaps, etc.). Tabs **138** are configured to engage features in impeller housing **124** to couple lock plate **122** to impeller housing **124**.

Impeller housing **124** is a generally thin-walled member with an inner diameter approximately equal the outer diameter of lock plate **122**. Impeller housing **124** has an open end **140** and a closed end **142** opposite open end **140**. Open end **140** has a plurality of key slots **44** spaced approximately equal to the spacing of tabs **138** on lock plate **122**. Impeller housing **124** is coupled to lock plate **122** by sliding impeller housing **124** over lock plate **122**, fitting tabs **138** into vertical portions **45** of key slots **44**. Impeller housing **124** is then rotated slightly, sliding tabs **138** into horizontal portions **46** of key slots **44**, substantially trapping tabs **138** in key slots **44** and compressing lock plate **122** between impeller housing **124** and basin **12**. Impeller housing **124** also includes one or more orifices **149** evenly spaced about the periphery of impeller housing **124** proximate open end **140**. Orifices **149** are openings (e.g., apertures, holes, outlets etc.) that allow fluid to be drawn into enclosure **120** by impeller **14**. Impeller housing **124** also includes one or more arcuate slots **159** evenly spaced about the periphery of impeller housing **124** proximate closed end **142**. Arcuate slots **159** are openings (e.g., apertures, holes, inlets etc.) that allow fluid to be pushed out of enclosure **120** by impeller **14**. Impeller housing **124** may be composed of various materials including plastic, metal, or some combination of plastic and metal. Similar to impeller housing **20** shown in FIG. **2**, impeller housing **124** may include a baffle similar to baffle **51** located therein.

According to other exemplary-embodiments, the fluid pressure may be raised or lowered by changing the shape or number of either orifices **149** or arcuate slots **159**.

For purposes of this disclosure, the term "coupled" means the joining of two components (electrical or mechanical) directly or indirectly to one another. Such joining may be stationary in nature or movable in nature. Such joining may be achieved with the two components (electrical or mechanical) and any additional intermediate members being integrally defined as a single unitary body with one another or with the two components or the two components and any additional member being attached to one another. Such joining may be permanent in nature or alternatively may be removable or releasable in nature.

The present disclosure has been described with reference to example embodiments, however workers skilled in the art will recognize that changes may be made in form and detail without departing from the spirit and scope of the invention. For example, although different example embodiments may have been described as including one or more features providing one or more benefits, it is contemplated that the described features may be interchanged with one another or alternatively be combined with one another in the described example embodiments or in other alternative embodiments. Because the technology of the present disclosure is relatively complex, not all changes in the technology are foreseeable. The present disclosure described with reference to the example is manifestly intended to be as broad as possible. For example, unless specifically otherwise noted a single particular element may also encompass a plurality of such particular elements.

It is also important to note that the construction and arrangement of the elements of the system as shown in the preferred and other exemplary embodiments is illustrative only. Although only a certain number of embodiments have been described in detail in this disclosure, those skilled in the art who review this disclosure will readily appreciate that many modifications are possible (e.g., variations in sizes, dimensions, structures, shapes and proportions of the various elements, values of parameters, mounting arrangements, use of materials, colors, orientations, etc.) without materially departing from the novel teachings and advantages of the subject matter recited. For example, the pitch of the blades of impeller **14** may be changed to change the direction of fluid flow from the bottom to top of the impeller housing. The pitch of the blades could also be configured to increase the pressure of the fluid flow if this is desired. Additionally, the blades of the impeller could be arranged such that the water flowed into the impeller housing through openings **49** and exited through openings **59**. It is also contemplated that openings **59** could be located on the lower portion of impeller housing **20** and openings **49** could be located on the upper portion of impeller housing **20**. Impeller as used herein covers both an impeller and propeller. Further, elements shown as integrally formed may be constructed of multiple parts or elements shown as multiple parts may be integrally formed, the operation of the assemblies may be reversed or otherwise varied, the length or width of the structures and/or members or connectors or other elements of the system may be varied, the nature or number of

adjustment or attachment positions provided between the elements may be varied. It should be noted that the elements and/or assemblies of the system may be constructed from any of a wide variety of materials that provide sufficient strength or durability. Accordingly, all such modifications are intended to be included within the scope of the present disclosure. Other substitutions, modifications, changes and omissions may be made in the design, operating conditions and arrangement of the preferred and other exemplary embodiments without departing from the spirit of the present subject matter.

What is claimed is:

1. A pedicure spa containing fluid, comprising:

a fluid retaining basin;

an impeller coupled to the basin;

an enclosure removably coupled to the basin, the enclosure including an upper region and a lower region, and defining a plurality of orifices in the upper region and the lower region, with the enclosure configured to enclose the impeller and direct fluid flow towards a foot region of the basin defined between a wall of the basin and the lower region of the enclosure, and

an intermediate baffle positioned in the enclosure and separating the upper region and the lower region, with the baffle defining an annular opening, wherein the upper region is in fluid communication with the lower region, the impeller being located in the lower region and the baffle extending inwardly from the enclosure and extending over a portion of the impeller.

2. The pedicure spa of claim **1**, wherein the enclosure is a cylindrical impeller housing having a closed end proximate the upper region and an open end proximate the lower region.

3. The pedicure spa of claim **2**, including a lock plate coupled to the basin, with the lock plate defining a tab on the lock plate circumference edge, and the enclosure defines a key slot proximate the open end and configured to receive the tab within a portion of the key slot, wherein the enclosure is secured to the basin.

4. The pedicure spa of claim **2**, wherein the closed end of the enclosure is removably secured to the impeller housing.

5. The pedicure spa of claim **1**, wherein the impeller and enclosure are configured to direct fluid flow from the basin into the upper region of the enclosure and from the lower region of the enclosure back into the basin.

6. The pedicure spa of claim **1**, wherein the orifices are one of circular holes and elongated slots.

7. The pedicure spa of claim **6**, wherein the orifices are configured to produce a predetermined fluid pressure in the basin.

8. The pedicure spa of claim **1**, wherein the enclosure is composed of material from a group consisting of metal, plastic, and a combination of metal and plastic.

9. The pedicure spa of claim **1**, wherein the orifices are defined in a side wall of the enclosure.

10. A spa apparatus comprising:

a basin for retaining fluid;

an impeller coupled to the basin; and

an enclosure removably coupled to the basin, the enclosure having an upper region and a lower region, and defining a plurality of orifices in the upper region and the lower region, with the enclosure configured to enclose the impeller and direct fluid flow towards a foot region of the basin defined between a wall of the basin and the lower region of the enclosure, the enclosure including a lock plate coupled to the basin, with the lock plate defining a tab on the lock plate circumference edge, a cylindrical impeller housing having a first end and a second end, with the impeller housing defining a first key slot proximate the first end and configured to engage the tab, and with the impeller housing defining a protrusion proximate the second end; and

a cover having a closed end and an open end, with the cover defining a second key slot proximate the open end and configured to engage the protrusion, wherein the impeller is in fluid communication with the basin and enveloped in the enclosure when the tab and first key slot are engaged and the protrusion and second key slot are engaged.

11. The spa apparatus of claim **10**, wherein the orifices are defined in a sidewall of the impeller housing.

12. The spa apparatus of claim **10**, wherein the orifices are evenly spaced around the perimeter of the impeller housing and cover.

13. The spa apparatus of claim **10**, wherein the orifices and arcuate slots are configured to produce a predetermined fluid pressure in the basin.

14. The spa apparatus of claim **10**, wherein one of the impeller housing and cover is composed of material from a group consisting of metal, plastic, and a combination of metal and plastic.

15. The spa apparatus of claim **10**, wherein the impeller housing and cover are a single unitary member.

16. The spa apparatus of claim **10**, wherein the basin is configured as a pedicure basin.

17. The spa apparatus of claim **1**, wherein the impeller has a rotational axis and an outer edge distal from the rotational axis, the baffle extending inwardly over the outer edge of the impeller toward the rotational axis of the impeller, the baffle opening being offset from the outer edge of the impeller toward the rotational axis of the impeller.

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